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CARI Project Postdoctoral Recruitment: Role, Interview Questions, and Information

The Cybercrime and Security Innovation (CSI) Centre
Leeds Beckett University

2018

These materials were **primarily intended for internal recruitment purposes**; however, these are made available in the interest of informing future police-academia collaborations.

The CARI Project

The CARI Project is a large-scale collaboration between West Yorkshire Police and the Cybercrime and Security Innovation Centre (CSI Centre) at Leeds Beckett University. The CARI Project aims to improve and incorporate an evidence-based approach into the policing of digital forensics and cybercrime investigations. An extensive needs assessment of UK policing and cybercrime and digital evidence was conducted to understand the current situation, and to identify needs across the force. The CARI Project also involved implementing a training and research programme that has impacted the capability of the digital forensics and cyber units within West Yorkshire Police to engage in research. This needs assessment and research training led to the development of a set of research proposals, which were scored and selected. Subsequently, academics and police staff co-produced 9 research and development workstreams: a framework for seizure, preservation and preservation of cloud evidence; automated forensic analysis; image linkage for victim identification and framework for image fingerprint management; automated grooming detection; frontline officer awareness development and decision support mobile app; assessment of methods of cyber training; an evaluation of the role of the Digital Media Investigator within WYP; and characteristics of victims of cybercrime. Each of these projects were designed to address needs within law enforcement and outputs include evidence-based procedures, new capabilities such as software/algorithms, and actionable intelligence.

This work was supported by a Police Knowledge Fund grant, administered by the Home Office, College of Policing, and the Higher Education Funding Council for England (HEFCE).



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POLICE

Postdoctoral Research Fellow (Data Analyst/Scientist)

This is an opportunity to take a pivotal role in an 18 month funded research collaboration, working on-site with West Yorkshire Police to propose and evaluate approaches to digital cybercrime investigations, and to help develop a research culture within the force while assisting and guiding officers conducting research.

This role will focus on the quantitative analytic aspects of research questions.

The role will entail collaboration on a number of research projects selected based on the needs of the force, using appropriate data acquisition, statistical and/or machine-learning methods. It may also involve writing software to implement proposed solutions, which will be evaluated and used in the field.

You will be working alongside another postdoctoral researcher, approximately 20 police officers who will be engaging in research, and a team of Leeds Beckett University academics. A mentoring role will be provided by an academic who has a substantial track record in working with police partners on research and knowledge transfer projects.

Key competencies:

- The successful candidate will have been awarded (or in the final stages of obtaining) a PhD (or equivalent research experience) in computer science, statistics, or a related discipline
- A strong understanding of appropriate quantitative research methods and associated statistical tests is essential

Desired attributes (preferred but not all essential):

- Expertise in data extraction, manipulation and visualization: for example, using regular expressions or SQL
- Relevant programming skills: for example, Java, Python, and/or R
- Knowledge of advanced analytics concepts and algorithms: such as experience with big data, machine-learning/predictive modelling, and text mining
- Experience with related tools and platforms, such as databases, Hadoop, and expert systems
- Experience with police procedures, or digital forensics techniques and associated tools (such as Encase, FTK)
- An excellent research publication track record in a related field

Job responsibilities include:

- Propose, design, and conduct quantitative research, based on project priorities
- Advise the teams on the application of analytical methods to specific research questions
- Author reports and peer-reviewed publications on findings in collaboration with the project teams
- Attend regular meetings with project teams
- Communicate project progress and findings to funding agency and steering committee and via the project website
- Contribute towards a new grant application to continue the collaboration

Please refer to the Job Description document for further employee specifications and application assessment criteria.

More about the research collaboration

The 18-month, £640,000 Leeds Beckett project entitled 'An evidence-based approach to fighting cybercrime from the frontline: improving the effectiveness and efficiency of investigating cyber enabled crime', will be led by Dr Z. Cliffe Schreuders, an established researcher in the field of computer security and forensics. He will be collaborating with an academic team including: Emlyn Butterfield, who leads the University's undergraduate and postgraduate courses in computer forensics and security; Dr John Elliott, Reader in Intelligence Engineering; Dr Tom Cockcroft, Senior Lecturer in Criminology; and Hugo Smith, Course Leader for the Broadcast Media Technologies degree programme, who will create a video documentary of the project.

The Leeds Beckett University academics will work in close collaboration with West Yorkshire Police. Cyber investigation officers will undergo research training and will be part of the team, who will also be collaborating directly with police forces to conduct innovative research projects, focusing on weaknesses in police processes.

The aim of the collaborative activity is to improve and incorporate an evidence-based approach into the frontline policing of digital forensics and cyber crime investigations. This will be achieved by establishing a research and training collaboration, the Cyber Analysis Research Initiative (CARI), between West Yorkshire Police and Leeds Beckett University; with outputs designed for transfer and implementation into any police force. Two onsite postdoctoral researchers will work with Leeds Beckett staff to collaborate, train, facilitate and guide the Hi-Tech Crime Unit (HTCU) and Cyber Crime Unit (CCU) to conduct primary research, and to design process, procedure, tools and a training programme to improve the response and investigation of cyber crime. The CCU is a new police unit, which is

being created to support frontline officers to develop cyber investigation strategies for reported cyber enabled crimes, use cyber investigation methods to progress the cyber element of such crimes, and to identify best processes to recover digital evidence. The development of CARI will feed directly into the design and facilitation of the CCU.

Cyber crime is not exclusively a technical problem; this research will analyse the cyber-investigation lifecycle: from the experience of the public when reporting cyber crime, to the call taker, the attending officer, investigator, and the Crown Prosecution Service, to identify key knowledge gaps and needs in the policing of cyber enabled crime. Academics will supervise force personnel and jointly conduct primary research exploring ways to maximise the efficacy and efficiency of cyber investigations. This collaboration will propose and evaluate process, practice and technological solutions to improve and expedite the identification, triage, acquisition, analysis and presentation of digital evidence. The research output will feed directly into training and equipping the force to deploy evidence-based solutions to cyber investigations, while also enabling the force to further engage in research and professional development. This will allow the force to become self sustaining through the development of innovative solutions to digital based evidence problems and new technology, and through active engagement in research activities.

The planned collaboration will involve the entire HTCUs and CCUs teams, provide them with training and personal development, and enable them to take an active research role, under the supervision, and in collaboration with, Leeds Beckett academics. Two postdoctoral researchers will be deployed on-site at West Yorkshire Police to facilitate the work.

Following an initial needs analysis (both in terms of frontline response and digital evidence processing), force staff will work with academics to identify research project priorities. Then, working alongside academics acting as research coordinators to facilitate and supervise research, force staff will undertake research, which will feed back into these cyber-investigation units and other forces within the region that are involved in the response to cyber crime.

For 12 months, all of the members of both of the West Yorkshire cyber investigation units will have dedicated time for research and collaboration, working on a portfolio of research and training development projects, which will be based on existing literature and a needs analysis, and will feed into the design and development of training, and tools and techniques to enable the effective fighting of cyber crime.

The overarching aim of this activity is to build an innovative research program that benefits all facets of the force, from the frontline call takers through to the

HTCU/CCU and the Crown Prosecution Service (CPS); creating a centre of excellence for the research and dissemination of cyber investigation policing throughout the UK; and helping to develop a long-term culture of research and evidence-based national standards and working practices for all areas of cyber investigations.

Postdoctoral Research Fellow (Mixed Methods)

This is an opportunity to take a pivotal role in an 18 month funded research collaboration, working on-site with West Yorkshire Police to propose and evaluate approaches to digital cybercrime investigations, and to help develop a research culture within the force while assisting and guiding officers conducting research.

This applied research role will involve conducting qualitative as well as quantitative research. You will be responsible for organising one of the most critical aspects of the collaboration: an extensive needs assessment, analysing the needs of West Yorkshire Police, the results of which will be used to propose, design, and conduct a multitude of research projects. You will also responsible for conducting focus groups, surveys, and interviews.

You will be working alongside another postdoctoral researcher, approximately 20 police officers who will be engaging in research, and a team of Leeds Beckett University academics. A mentoring role will be provided by an academic who has a substantial track record in working with police partners on research and knowledge transfer projects.

Key competencies:

- The successful candidate will have been awarded (or in the final stages of obtaining) a PhD (or equivalent research experience)
- A strong understanding of appropriate qualitative and quantitative research methods, including qualitative analysis of textual data and quantitative statistical analysis, and the ability to identify appropriate research methods for research questions

Desired attributes (preferred but not all essential):

- Experience using research analysis software packages (such as SPSS, R, and/or Nvivo)
- Experience designing and conducting focus groups, interviews, surveys, action research, and/or case studies
- Experience conducting qualitative analysis of textual and interview-derived data
- Experience applying quantitative statistical tests
- Experience conducting systematic reviews
- Relevant programming skills (for example, Java, Python, and/or R)

- Experience with police procedures, or digital forensics techniques and associated tools (such as Encase, FTK)
- An excellent research publication track record in a related field

Job responsibilities include:

- Collaboratively conduct a needs assessment and training needs assessment
- Conduct secondary research literature reviewing
- Propose, design, and conduct mixed methods research, based on identified priorities
- Advise the teams on the application of methods of enquiry appropriate for specific research questions
- Author reports and peer-reviewed publications on findings in collaboration with the project teams
- Attend regular meetings with project teams
- Assist with the organisation of seminars and meetings
- Assist with Ethics, research governance, and data access processes
- Contribute towards a new grant application to continue the collaboration

Please refer to the Job Description document for further employee specifications and application assessment criteria.

More about the research collaboration

The 18-month, £640,000 Leeds Beckett project entitled 'An evidence-based approach to fighting cybercrime from the frontline: improving the effectiveness and efficiency of investigating cyber enabled crime', will be led by Dr Z. Cliffe Schreuders, an established researcher in the field of computer security and forensics. He will be collaborating with an academic team including: Emlyn Butterfield, who leads the University's undergraduate and postgraduate courses in computer forensics and security; Dr John Elliott, Reader in Intelligence Engineering; Dr Tom Cockcroft, Senior Lecturer in Criminology; and Hugo Smith, Course Leader for the Broadcast Media Technologies degree programme, who will create a video documentary of the project.

The Leeds Beckett University academics will work in close collaboration with West Yorkshire Police. Cyber investigation officers will undergo research training and will

be part of the team, who will also be collaborating directly with police forces to conduct innovative research projects, focusing on weaknesses in police processes.

The aim of the collaborative activity is to improve and incorporate an evidence-based approach into the frontline policing of digital forensics and cyber crime investigations. This will be achieved by establishing a research and training collaboration, the Cyber Analysis Research Initiative (CARI), between West Yorkshire Police and Leeds Beckett University; with outputs designed for transfer and implementation into any police force. Two onsite postdoctoral researchers will work with Leeds Beckett staff to collaborate, train, facilitate and guide the Hi-Tech Crime Unit (HTCU) and Cyber Crime Unit (CCU) to conduct primary research, and to design process, procedure, tools and a training programme to improve the response and investigation of cyber crime. The CCU is a new police unit, which is being created to support frontline officers to develop cyber investigation strategies for reported cyber enabled crimes, use cyber investigation methods to progress the cyber element of such crimes, and to identify best processes to recover digital evidence. The development of CARI will feed directly into the design and facilitation of the CCU.

Cyber crime is not exclusively a technical problem; this research will analyse the cyber-investigation lifecycle: from the experience of the public when reporting cyber crime, to the call taker, the attending officer, investigator, and the Crown Prosecution Service, to identify key knowledge gaps and needs in the policing of cyber enabled crime. Academics will supervise force personnel and jointly conduct primary research exploring ways to maximise the efficacy and efficiency of cyber investigations. This collaboration will propose and evaluate process, practice and technological solutions to improve and expedite the identification, triage, acquisition, analysis and presentation of digital evidence. The research output will feed directly into training and equipping the force to deploy evidence-based solutions to cyber investigations, while also enabling the force to further engage in research and professional development. This will allow the force to become self sustaining through the development of innovative solutions to digital based evidence problems and new technology, and through active engagement in research activities.

The planned collaboration will involve the entire HTCU and CCU teams, provide them with training and personal development, and enable them to take an active

research role, under the supervision, and in collaboration with, Leeds Beckett academics. Two postdoctoral researchers will be deployed on-site at West Yorkshire Police to facilitate the work.

Following an initial needs analysis (both in terms of frontline response and digital evidence processing), force staff will work with academics to identify research project priorities. Then, working alongside academics acting as research coordinators to facilitate and supervise research, force staff will undertake research, which will feed back into these cyber-investigation units and other forces within the region that are involved in the response to cyber crime.

For 12 months, all of the members of both of the West Yorkshire cyber investigation units will have dedicated time for research and collaboration, working on a portfolio of research and training development projects, which will be based on existing literature and a needs analysis, and will feed into the design and development of training, and tools and techniques to enable the effective fighting of cyber crime.

The overarching aim of this activity is to build an innovative research program that benefits all facets of the force, from the frontline call takers through to the HTCU/CCU and the Crown Prosecution Service (CPS); creating a centre of excellence for the research and dissemination of cyber investigation policing throughout the UK; and helping to develop a long-term culture of research and evidence-based national standards and working practices for all areas of cyber investigations.

General introductions.

Presentation

As noted in your invitation to the interview, you have been asked to prepare a 5 minute informal presentation on one of your outputs (such as a paper) and how the research methods or results may inform our project. Please start when you are ready.

Research methods and project outlook

Tell us about yourself. Please give a brief overview of your research and what you have contributed to your field.

Please give an overview of the research methods you have used in the past.

Follow up: How would you explain (one method) to a layperson?

This post will involve working collaboratively on a range of research projects...

What kinds of research methods or projects would you feel confident advising team members on and being involved in?

What have you read about the project? And from what you have read about the project, what do you envision your typical day will involve?

We will be conducting a number of research studies in collaboration with West Yorkshire Police, to improve cybercrime investigation. Please outline some possible research directions you would suggest if you are the successful candidate for this position.

Skills

How confident are you in terms of programming skills?

... Statistical analysis, and research analysis software?

(If data scientist:)

Data extraction (SQL, regexp), advanced analytics, related tools and platforms?

(If mixed methods)

Qualitative research methods, including focus groups, surveys, action research?

Textual analysis?

Any experience working with police or with digital forensics software or procedures?

Do you have any other relevant skills or experience you would like to bring to our attention?

Funding

Do you have any experience applying for research funding? How would you go about seeking funding to continue the collaboration between West Yorkshire Police and Leeds Beckett beyond the funded period?

Conclusion

Do you have any questions for us; for example, about the role or the project?

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Postdoctoral applications close 12th October.

For informal enquiries and guidance please contact Dr Z. Cliffe Schreuders (c.schreuders {at} leedsbeckett.ac.uk).